Master Projects Software Analysis and Transformation

**Short agile feedback loops**
**Keywords:** workflow diagrams, code generation, UI design, Cloud/serverless, Rascal MPL  
**Supervisors:** Jurgen Vinju (CWI) and Tim Soethout (ING)  
More information:

- ING is interested in enabling short agile feedback loops of prototyping financial (b2b and b2c) services
- Non green fields situation (integrating in existing systems)
- Model driven engineering

The project may be hosted at TUE/CWI (not hired by ING).

**Static Analysis across language boundaries**
**Keywords:** Rascal MPL, Code to model, Security  
**Supervisor:** Jurgen Vinju (CWI/TUE)  
More information:

- Static analysis across language boundaries
- Example cross-language interactions
  - Webclient (Js/TypeScript) / Webserver (Java)
  - Java/JNI/{C, Python, Ada}
  - C#/F#  
  - Remote Procedure Calls (XML-RPC, JSON-RPC)
- Reverse engineering data and control flow
  - Connecting the dots
  - Removing (trusted) implementation layers
- Can we make this scale?
  - Effort per language/framework?
  - (Modular) Analysis efficiency?

This project may be hosted at TUE/CWI.

**RADCAL: new semantics for arithmetic**
**Keywords:** JVM, arithmetic, Midpoint Radius Algebra  
**Supervisor:** Jurgen Vinju (CWI/TUE)  
More information:

- RADCAL: new semantics for arithmetic
  - RadCal is a design for programming language arithmetic with 100% exact rationals, and automatic precision management for reals based on midpoint radius algebra.
  - No more floating point errors
- No more implicit inaccuracy
- No more cumulative errors
- Looking for a Java/OO specialist to prototype and evaluate smart implementations on the JVM
- Learn from open-source competitors
- Make it fast, faster, fastest.
- For applications in DSLs and Rascal MPL

This project may be hosted at TUE/CWI.

**Philips Image Guided Therapy**

**Keywords:** C++, Architecture Degredation, IDEs, Rascal, CLaiR  
**Supervisors:** Jurgen Vinju and Mathijs Schuts

More information:

- Philips Image Guided Therapy
- Architecture Degradation Analysis in the IDE
  - Bring architectural guidelines into VSCode C++
  - Rascal and ClaiR for fact extraction/analysis
- Questions?
  - What is a concise and maintainable method of specifying practical architecture degradation patterns?
  - What is the accuracy of the patterns? How can they be improved?
  - How to bring ADA to the IDE?

This project may be hosted at TUE/CWI.

**ICTU is overheidsorgaan voor digitalisering**

**Keywords:** Python, Web, Continuous Integration, Rascal, Python AIR  
**Supervisors:** Jurgen Vinju and Frank Niessink

More information:

ICTU is overheidsorgaan voor digitalisering

- Architecture Degradation Analysis: Python
  - Static Analysis of Weakly typed language
  - Rascal and Python-Air for fact extraction/analysis
- Questions?
  - What is a concise and maintainable method of specifying practical architecture degradation patterns?
  - What is the accuracy of the patterns? How can they be improved?
  - How to bring ADA to continuous integration?

This project may be hosted at TUE/CWI.